UNITED STATES PATENT AND TRADEMARK OFFICE

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/507,409	EDEN ET AL.
	Examiner	Art Unit	
	NATHAN ERB	3628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>30 April 2008</u>.

2a) ☐ This action is **FINAL.**   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1,2,7-11,14-17 and 20-30</u> is/are pending in the application.

   4a) Of the above claim(s) <u>20,21 and 30</u> is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1,2,7-11,14-17 and 22-29</u> is/are rejected.

7) ☒ Claim(s) <u>1,2,7-11,14-17,23,24 and 26-29</u> is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>13 September 2004</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☐ All   b)☐ Some * c)☐ None of:

   1. ☐ Certified copies of the priority documents have been received.

   2. ☐ Certified copies of the priority documents have been received in Application No. _____.

   3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
   Paper No(s)/Mail Date <u>20050902</u>

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1.   The preliminary amendment filed on September 13, 2004, was technically non-compliant. When an entire new paragraph is being inserted into the specification in an amendment, the new paragraph should not be underlined. However, due to the minor nature of the non-compliance and in the interest of expediting prosecution of this application, this Office action is being issued anyway.

Election/Restrictions

2.   Applicant's election without traverse of claims 1-2, 7-11, 14-17, and 22-29 in the reply filed on April 30, 2008, is acknowledged.

3.   In response to Applicants' request for clarification with respect to claims 26-29, Examiner hereby clarifies that claims 26-29 are indeed part of the elected Invention Group I and thus are being examined in this Office action.

Priority

4.   Applicants' claim to priority in the specification amendment appears to have a typographical error. Applicants stated that International Application No. PCT/CA03/00352 was filed on March 13, 2003. However, the correct filing date for this application appears to be March 14, 2003. Please correct this error.

Information Disclosure Statement

5.   One of the references listed on the information disclosure statement, Cokins, Gary, <u>Activity-Based Cost Management</u>, 2001, pp. 1-374, John Wiley & Sons, Inc., Canada, could not be accessed by Examiner and thus could not be considered.

Examiner suggests re-submitting the reference as a non-bound document if it is
essential that Examiner consider this document.

Drawings

6.　　The drawings are objected to because portions of the drawings are either barely
legible or illegible.　Corrected drawing sheets in compliance with 37 CFR 1.121(d) are
required in reply to the Office action to avoid abandonment of the application. Any
amended replacement drawing sheet should include all of the figures appearing on the
immediate prior version of the sheet, even if only one figure is being amended. The
figure or figure number of an amended drawing should not be labeled as "amended." If
a drawing figure is to be canceled, the appropriate figure must be removed from the
replacement sheet, and where necessary, the remaining figures must be renumbered
and appropriate changes made to the brief description of the several views of the
drawings for consistency. Additional replacement sheets may be necessary to show the
renumbering of the remaining figures. Each drawing sheet submitted after the filing date
of an application must be labeled in the top margin as either "Replacement Sheet" or
"New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the
examiner, the applicant will be notified and informed of any required corrective action in
the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

7.　　Claims 1-2, 7-11, 14-17, 23-24, and 26-29 are objected to because of the
following informalities:

　　　a. In the third line of claim 1, please replace the word "interests" with --interest--.

b. In the first line of claim 2, please replace the word "A" with --The--.

c. In the first line of claim 2, please replace the word "including" with --further comprising--.

d. In the first line of claim 7, please replace the word "A" with --The--.

e. In the first line of claim 7, please replace the word "including" with --further comprising--.

f. In the second line of claim 7, please remove the comma.

g. In the first line of claim 8, please replace the phrase "A method" with --The method--.

h. In the second line of claim 8, please insert a comma immediately after the first occurrence of the word "matrix."

i. In the first line of claim 9, please replace the word "A" with --The--.

j. In the first line of claim 9, please replace the word "including" with --further comprising--.

k. In the first line of claim 10, please replace the word "A" with --The--.

l. In the first line of claim 10, please replace the word "including" with --further comprising--.

m. In the first line of claim 11, please replace the word "A" with --The--.

n. In the first line of claim 11, please insert a comma immediately after the number "7."

o. In the first line of claim 11, please replace the word "including" with --further comprising--.

p. In the first line of claim 14, please replace the word "A" with --The--.

q. In the first line of claim 14, please replace the word "including" with --further comprising--.

r. In the first line of claim 15, please replace the phrase "A method" with --The method--.

s. In the second line of claim 15, please insert a comma immediately after the first occurrence of the word "matrix."

t. In the first line of claim 16, please replace the word "A" with --The--.

u. In the first line of claim 16, please replace the word "including" with --further comprising--.

v. In the first line of claim 17, please replace the word "A" with --The--.

w. In the first line of claim 17, please replace the word "including" with --further comprising--.

x. In the first line of claim 23, please replace the word "A" with --The--.

y. In the first line of claim 23, please insert a comma immediately after the number "22."

z. In the first line of claim 23, please replace the word "including" with --further comprising--.

aa. In the fifth line of claim 24, please replace the word "or" with --of--.

bb. In the first line of claim 26, please replace the word "A" with --The--.

cc. In the first line of claim 26, please replace the word "including" with --further comprising--.

dd. In the first line of claim 27, please replace the word "A" with --The--.

ee. In the first line of claim 27, please replace the word "including" with --further comprising--.

ff. In the first line of claim 28, please replace the word "A" with --The--.

gg. In the first line of claim 28, please replace the word "including" with --further comprising--.

hh. In the first line of claim 29, please replace the word "A" with --The--.

ii. In the first line of claim 29, please replace the word "including" with --further comprising--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-2, 7-11, 14-17, and 22-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As per **Claims 1, 22, 24, and 25**, each of these claims refers to a p'RUm analysis according to Broyles and Lay. This is indefinite because the p'RUm analysis is limited by what two people think. Since what Broyles and Lay consider to be a p'RUm analysis could change over time, it is unclear what the limiting effect of the language of "according to Broyles and Lay" would be. Assuming that there are no other types of

analyses known as a p'RUm analysis, besides that referred to in Applicants'

specification, Examiner believes the language of "p'RUm analysis," by itself, would be a

sufficient identification of the analysis in the claims, as opposed to the language of

"p'RUm analysis according to Broyles and Lay." If this is indeed the case, Examiner

recommends overcoming these rejections by removing the language "according to

Broyles and Lay" from each of these claims. If there are other types of p'RUm

analyses, besides that according to Broyles and Lay, from which Applicants which to

distinguish their invention, Examiner recommends that Applicants distinguish their

invention using language, supported in the specification, other than "according to

Broyles and Lay."

As per **Claims 2, 7-11, 14-17, 23, and 26-29**, these claims depend, either

directly or indirectly, from claims 1, 22, 24, or 25, yet do not remedy the indefiniteness

issues of those claims. Therefore, claims 2, 7-11, 14-17, 23, and 26-29 are also

indefinite.

Claim Rejections - 35 USC § 101

10.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

11.   Claims 1-2, 7-11, 14-17, and 25-29 are rejected under 35 U.S.C. 101 because

the claimed invention is directed to non-statutory subject matter. Claims 1-2, 7-11, 14-

17, and 25-29 are directed to a series of steps. In order for a series of steps to be

considered a proper process under § 101, a claimed process must either: (1) be tied to another statutory class (such as a particular apparatus) or (2) transform underlying subject matter (such as an article or materials). *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972). Thus, to qualify as patent eligible, these processes should positively recite the other statutory class to which they are tied (e.g., by identifying the apparatus that accomplishes the method steps), or positively recite the subject matter that is being transformed (e.g., by identifying the product or material that is changed to a different state). Claims 1-2, 7-11, 14-17, and 25-29 identify neither the apparatus performing the recited steps nor any transformation of underlying materials, and accordingly are directed to non-statutory subject matter.

12.   Claims 1-2, 7-11, 14-17, and 22-29 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. In order to be patentable, an invention involving an abstract idea must produce a useful, concrete, and tangible result. *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 47 USPQ2d 1596, 1600-1601 (Fed. Cir. 1998). The inventions of these claims do not produce concrete results. A result is considered concrete if it is substantially repeatable or substantially predictable upon being repeated. These claims substantively incorporate the judgment of human beings (that is, Broyles and Lay), which is not substantially predictable upon being repeated. Therefore, these claims do not produce concrete results and are not patentable.

Note that since these rejections are based on the same "according to Broyles

and Lay" language on which the above rejections under 35 U.S.C. 112, second

paragraph, are based, correcting the issues under 35 U.S.C. 112, second paragraph,

may also render the claims to be concrete.

Claim Rejections - 35 USC § 103

13.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

14.   Claims 1-2, 7-10, and 14-17 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Broyles, Robert W., and Lay, Colin M., "Budgeting and Controllable

Cost Variances: The Case of Multiple Diagnoses, Multiple Services, and Multiple

Resources," Journal of Medical Systems, 1982, Vol. 6, No. 6, pp. 599-611.

As per **Claim 1**, Broyles et al. discloses:

- a method of cost variance analysis (p. 599, section A; p. 603, section B; p. 608,

section C; p. 609, section D);

- assessing variables p (price), R (efficiency), U (utilization) and m (product mix)

(p. 603, section B);

- at least one of the variables being a variable of interests comprising a plurality

of influencing factors (p. 604, section E; p. 605, section F; p. 603, section G; variable of

interest here is price of labor, a type of price; influencing factors are the various

categories of labor into which the labor prices may be classified);

    - expressing the variable of interest as a matrix having a plurality of columns,

each column representing an influencing factor (p. 604, section E; p. 605, section F; p.

603, section G; variable of interest here is price of labor, a type of price; influencing

factors are the various categories of labor into which the labor prices may be classified;

this corresponds to the converting of the vector for price of labor into the diagonal matrix

P_{d1}; standard procedure for diagonalizing a vector in linear algebra comprises taking the

elements of the vector and placing them, in order, in the diagonal matrix, along a

diagonal from the upper left position of the matrix to the lower right position of the

matrix; this also defines the matrix size through the length of the diagonal; the rest of

the diagonal matrix is filled in by zeros; if labor price vector was originally a single row

vector of various labor prices, each type of labor price would end up in its own column in

the diagonal matrix; therefore, each column would correspond to an influencing factor,

that is, a category of labor into which the labor prices may be classified);

    - conducting p'RUm analysis according to Broyles and Lay, substituting the

matrix for the variable of interest (p. 604, section E; p. 605, section F; p. 603, section G;

variable of interest here is price of labor, a type of price; price-of-labor diagonal matrix

P_{d1} is substituted into the general Broyles-Lay p'RUm function).

    Broyles et al. fails to disclose wherein the variable of interest (that is converted

into a matrix having a plurality of columns, each column representing an influencing

factor, which is then substituted for the variable of interest in the p'RUm analysis) is an

overall variable of interest (that is, an overall set of prices), as opposed to a subset of an

overall variable of interest (that is, a subset of prices [such as labor prices] wherein the

resulting analysis would be based on the subset of an overall variable of interest [the

labor prices]). However, Broyles et al. does disclose conducting a p'RUm analysis

wherein p' is an overall variable of interest (that is, an overall set of prices) wherein the

resulting analysis would be based on that overall variable of interest (the overall set of

prices) (p. 603, section B). All of the component parts are known in Broyles et al. The

only difference is the combination of the "old elements" into a single method by using

the overall set of prices for p' in place of only the set of labor prices. Thus, it would have

been obvious to one having ordinary skill in the art to use the overall set of prices for p',

as taught by Broyles et al., but in place of only the set of labor prices in the special

application of p'RUm analysis that is also taught by Broyles et al. This is because it is

clear from Broyles et al. that any set of an organization's resource prices may be

substituted for p' in a p'RUm analysis, in which case the standard mathematical

manipulations of the data according to the p'RUm analysis would have predictable

results.

As per **Claim 2**, Broyles et al. further discloses assessing the impact of an

influencing factor on cost variance attributable to the variable of interest (p. 604, section

E; p. 605, section F; p. 603, section G).

As per **Claim 7**, Broyles et al. further discloses combining the variables U (utilization) and m (product mix), to obtain the variable of interest Um which represents volume of services (p. 606, section H).

As per **Claim 8**, Broyles et al. further discloses wherein the matrix is a diagonal matrix and each column of the matrix represents a particular activity and gives the volume of activities for the production of all products (p. 606, section H; p. 605, section I; p. 606, section J; p. 603, section G; p. 603, section B; this would be the diagonal matrix V_a that results when the volume vector $U_a m_a$ is diagonalized in p. 606, section J; because m_a is a vector of order v[number of patient types] x 1, and U_a is a matrix of w[number of types of activities/services] x v[number of patient types], $U_a m_a$ would be a vector of order w[number of types of activities/services] x 1, due to the rules of linear algebra; due to the rules of linear algebra, $U_a m_a$ would thus be a vector including a series of numbers, each number representing the amount of a corresponding activity/service; when a vector is diagonalized in linear algebra, the result is a diagonal matrix, with the elements of the vector, in the same sequence, occupying the diagonal elements from the upper left corner of the matrix to the lower right corner of the matrix, and all the remaining elements of the matrix each equaling zero; since each number of the vector $U_a m_a$ represented the volume of a specific category of activity/service, and each element of the vector $U_a m_a$ occupies its own separate column of the diagonal matrix, each column of the diagonal matrix corresponds to a particular activity and gives

the volume for its particular activity for the production of all products [in this case, patients treated]).

As per **Claim 9**, Broyles et al. does not explicitly disclose pre-multiplying the matrix by R to give resources by activities matrices. However, Broyles et al. does further disclose the following equation:

$$\text{Var } [Eff_{(j, q), k}] = P_s (R_a - R_s) V_a$$

in which V_a is a diagonal matrix formed from the diagonalization of the vector $U_a m_a$ (p. 605, section I; p. 606, section J). Standard algebraic "order of operations" rules indicate the following series of operations to solve for Var $[Eff_{(j, q), k}]$:

Step 1: Calculate $R_a - R_s$.

Step 2: Calculate P_s times "the result of Step 1."

Step 3: Calculate "the result of Step 2" times V_a, which gives the answer, Var $[Eff_{(j, q), k}]$. However, under the rules of linear algebra, matrix multiplication is both distributive [that is, $X(Y+Z)=XY+XZ$] and associative [that is, $X(YZ)=(XY)Z$]. Therefore, the following would be an equivalent series of operations to solve for Var $[Eff_{(j, q), k}]$:

Step 1: Calculate R_a times V_a.

Step 2: Calculate R_s times V_a.

Step 3: Calculate "the result of Step 1" minus "the result of Step 2."

Step 4: Calculate P_s times "the result of Step 3," which gives the answer, Var $[Eff_{(j, q), k}]$.

Step 1 in the second calculation option above corresponds to the claimed limitation of "pre-multiplying the matrix by R to give resources by activities matrices." As was

discussed in the rejection for claim 8 above, each column of the diagonal matrix V_a

corresponds to a particular activity and gives the volume for its particular activity;

therefore, the order of V_a is (number of types of activities) x (number of types of

activities). According to Broyles et al. (p. 603, section B), R_a is a matrix of order

(number of types of resources) x (number of types of activities/services). Due to the

rules of linear algebra then, the result of Step 1 in the second calculation option above

will be a matrix of the order (number of types of resources) x (number of types of

activities). So, due to the rules of linear algebra, that resulting matrix will be a resource-

by-activities matrix, as required by claim 9. Therefore, Step 1 of the second calculation

option above corresponds to the limitation of claim 9.

In conclusion, the prior art (Broyles et al.) contained a method which differed

from the claimed method by the substitution of some components (the second

calculation option above) with other components (the first calculation option above).

The substituted components (the calculation options) and their functions (solving

algebraic equations) were well-known in the art (the distributive and associative

properties of matrix multiplication were well-known to one of ordinary skill in the art at

the time of Applicants' invention). One of ordinary skill in the art could have substituted

one known component (the second calculation option above) for the other known

component (the first calculation option above), resulting in the limitation of claim 9, and

the results of the substitution would have been predictable (the two calculation options

were known to be equivalent as a consequence of the distributive and associative

properties of matrix multiplication). Therefore, claim 9 is obvious over Broyles et al.

As per **Claim 10**, Broyles et al. does not explicitly disclose pre-multiplying the
matrix by p' to give dollars by activities vectors. However, Broyles et al. does further
disclose the following equation:

$$\text{Var (Eff)} = p_s' (R_a - R_s) U_a m_a$$

(Broyles et al.; Equation 6; p. 605, section I). Broyles et al. also is clear that diagonal
matrix V_a may be formed by diagonalizing the vector $U_a m_a$ and substituted for $U_a m_a$ in
the above equation (Broyles et al.; p. 605, section I; p. 606, section J). When that is
done, the following equation results:

$$\text{Var (Eff)} = p_s' (R_a - R_s) V_a$$

Standard algebraic "order of operations" rules indicate the following series of operations
to solve for Var (Eff):

Step 1: Calculate $R_a - R_s$.

Step 2: Calculate p_s' times "the result of Step 1."

Step 3: Calculate "the result of Step 2" times V_a, which gives the answer, Var (Eff).

However, under the rules of linear algebra, matrix multiplication is both distributive [that
is, X(Y+Z)=XY+XZ] and associative [that is, X(YZ)=(XY)Z]. Therefore, the following
would be an equivalent series of operations to solve for Var (Eff):

Step 1: Calculate R_a times V_a.

Step 2: Calculate R_s times V_a.

Step 3: Calculate p_s' times "the result of Step 1."

Step 4: Calculate p_s' times "the result of Step 2."

Step 5: Calculate "the result of Step 3" minus "the result of Step 4," which gives the

answer, Var (Eff).

Step 3 in the second calculation option above corresponds to the claimed limitation of

"pre-multiplying the matrix by p' to give dollars by activities vectors." As was discussed

in the rejection for claim 9 above, the resulting matrix of claim 9 will be a resource-by-

activities matrix of the order (number of types of resources) x (number of types of

activities). p_s' is a vector of order 1 x (number of types of resources), the elements of

the vector representing the prices of the corresponding resources (Broyles et al., p. 603,

section B). Due to the rules of linear algebra, the result of p_s' times the result of (R_a

times V_a) will be a matrix of the order 1 x (number of types of activities), that is, a vector

of prices, with each price corresponding to one of the types of activities. Therefore,

Step 3 of the second calculation option above corresponds to the limitation of "pre-

multiplying the matrix by p' to give dollars by activities vectors."

        In conclusion, the prior art (Broyles et al.) contained a method which differed

from the claimed method by the substitution of some components (the second

calculation option above) with other components (the first calculation option above).

The substituted components (the calculation options) and their functions (solving

algebraic equations) were well-known in the art (the distributive and associative

properties of matrix multiplication were well-known to one of ordinary skill in the art at

the time of Applicants' invention). One of ordinary skill in the art could have substituted

one known component (the second calculation option above) for the other known

component (the first calculation option above), resulting in the limitation of claim 10, and

the results of the substitution would have been predictable (the two calculation options were known to be equivalent as a consequence of the distributive and associative properties of matrix multiplication). Therefore, claim 10 is obvious over Broyles et al.

As per **Claim 14**, Broyles et al. further discloses combining the variables R, U and m to obtain the variable of interest RUm which represents volume of resources (p. 604, section E; p. 605, section I; p. 607, section K).

As per **Claim 15**, Broyles et al. fails to explicitly disclose wherein the matrix is a diagonal matrix and each column of the matrix represents a particular resource and gives the volume of resources for all activities for the production of all products. However, Broyles et al. does provide the following equation:

$$\text{Var } [\text{Eff}_{(j, q), k}] = P_s (R_a - R_s) V_a$$

(Broyles et al.; Equation 7; p. 606, section J). V_a is the matrix that is the result of the diagonalization of vector $U_a m_a$. As was discussed in the rejection for claim 9, it would have been obvious to calculate R_a times V_a on the way to calculating Var $[\text{Eff}_{(j, q), k}]$. This demonstrates that one may replace a vector in the p'RUm equation by a matrix diagonalized from the vector, and the equation remains correct. As addressed in claim 14 above, Broyles et al. repeatedly discusses the combination of RUm as a variable of interest (p. 604, section E; p. 605, section I; p. 607, section K). The order of R is (number of types of resources) x (number of types of activities), the order of U is (number of types of activities) x (number of types of patients), and the order of m is

(number of types of patients) x 1 (Broyles et al.; p. 603, section B). Therefore, the result

of RUm would be a vector of order (number of types of resources) x 1. As taught above

with respect to V_a, the vector RUm may be replaced by a diagonal matrix produced by

the diagonalization of the vector RUm in the equations of Broyles et al. Under the rules

of linear algebra, this matrix would consist of the elements of vector RUm sequentially

arranged diagonally from the upper left element of the matrix to the lower right element

of the matrix. All of the rest of the matrix elements would equal zero. Since each

element of the vector RUm represents a quantity of a particular resource and each

column of the diagonal matrix would correspond to an element of the vector RUm, each

column of the matrix would represent a particular resource and give the volume of the

resource. Therefore, this diagonal matrix meets the claim language of "wherein the

matrix is a diagonal matrix and each column of the matrix represents a particular

resource and gives the volume of resources for all activities for the production of all

products."

Broyles et al. discloses both the vector product RUm and that a vector product

may be replaced by its corresponding diagonal matrix in the equations of Broyles et al.

Therefore, the prior art included each element claimed. One of ordinary skill in the art

could have combined the elements as claimed by known methods because the

diagonalization process is the same for all such vector products. In combination, each

element merely would have performed the same function as it did separately because

the resulting diagonal matrix would still represent the variables RUm, just like the

original vector product on which it was based, and the resulting diagonal matrix would

still result in a categorical presentation of vector data, as was the case with

diagonalizing $U_a m_a$ to create V_a. One of ordinary skill in the art would have recognized

that the results of the combination were predictable because the operations of matrix

multiplication and vector diagonalization are mathematical manipulations with set,

consistent rules. Therefore, the combination of elements/limitations to produce

"wherein the matrix is a diagonal matrix and each column of the matrix represents a

particular resource and gives the volume of resources for all activities for the production

of all products" would have been obvious.

As per **Claim 16**, Broyles et al. does not explicitly disclose pre-multiplying the

matrix by p to give dollars for resources vectors. However, Broyles et al. does further

disclose the following equation:

$$\text{Var (Cost)} = p_a' \, R_a \, U_a \, m_a - p_s' \, R_s \, U_s \, m_s$$

(Broyles et al.; Equation 1; p. 603, section B). As was discussed in the rejection for

claim 15, it was also obvious over Broyles et al. to replace RUm in the equations of

Broyles et al. with a diagonal matrix produced by diagonalizing the vector RUm. Under

the rules of linear algebra, this produces a matrix of the order (number of types of

resources) x (number of types of resources), with the elements on the main diagonal of

the matrix giving the volume used of each type of resource, and the remaining matrix

elements equaling zero. Broyles et al. also discloses that p' is a vector of order 1 x

(number of types of resources) and that the elements of this vector represent the prices

of the various types of resources (Broyles et al.; p. 603, section B). Therefore, under

the rules of linear algebra, the result of pre-multiplying the resulting matrix of claim 15

by p' would be a vector of the order of 1 x (number of types of resources), with the

elements of the vector representing the total cost of each type of resource. This meets

the claimed language of "pre-multiplying the matrix by p to give dollars for resources

vectors." Since it was set forth in the rejection for claim 15 that it would have been

obvious over Broyles et al. to replace RUm in the equations of Broyles et al. with a

diagonal matrix produced by diagonalizing the vector RUm, it would have been obvious

to make this substitution in Equation 1 of Broyles et al. above, and the element/limitation

of "pre-multiplying the matrix by p to give dollars for resources vectors" would have

resulted.

As per **Claim 17**, Broyles et al. further discloses expressing all resources

acquired in a single column of the matrix (p. 604, section E; p. 605, section I; p. 607,

section K; as was discussed in the rejection for claim 15, RUm results in a matrix of

order [number of types of resources] x 1; since there is only a single column in which to

express all of the resources, Broyles et al. must be "expressing all resources acquired in

a single column of the matrix").

15.   Claims 11 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Broyles et al. in view of Munoz et al., U.S. Patent No. 7,149,700 B1.

As per **Claim 11**, Broyles et al. fails to disclose expressing all services that

belong in an organization unit in a single column of the matrix. Broyles et al. does

disclose expressing variables in terms of matrices, with the columns of the matrices representing influencing factors on the particular variable (p. 604, section E; p. 605, section F; p. 603, section G). Munoz et al. discloses expressing all services that belong in an organization unit in a single column of the matrix, that is, representing organization unit as an influencing factor (Figure 6A; Figure 6B; column 8, line 43, through column 9, line 17). Therefore, the prior art included each element claimed, although not necessarily in a single reference. One of ordinary skill in the art could have combined the elements as claimed by known methods because it would simply be a matter of substituting one type of influencing factors for another type of influencing factors in the matrices. In combination, each element merely would have performed the same function as it did separately (that is, Broyles et al's matrices would still be a way of calculating costs based on influencing factors, and Munoz et al.'s activity-department matrix would still perform the function of representing the allocation of activities among departments). One of ordinary skill in the art would have recognized that the results of the combination were predictable because it would be a matter of the simple substitution of one type of influencing factors for another, with the mathematical manipulations remaining the same. Therefore, it would have been obvious to combine the claimed elements/limitations of Broyles et al. and Munoz et al. to result in "expressing all services that belong in an organization unit in a single column of the matrix."

As per **Claims 22-24**, claim 22 is the system version of claim 1. Therefore, Broyles et al. provides the same disclosures with respect to claim 22 as it did in the rejection for claim 1. Broyles et al. fails to disclose a system for implementing its method. Munoz et al. discloses a system for implementing an activity-based costing method (column 8, lines 52-61). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the invention of Broyles et al. such that it is implemented by a system, as disclosed by Munoz et al. Motivation is provided in that it was well-known to one of ordinary skill in the art at the time of Applicants' invention that computers are often an efficient way to process data.

Claim 23 adds a means for storing the variables. Since Broyles et al. does not disclose a system for implementing its method, Broyles et al. also does not disclose this element/limitation. However, Munoz et al. does (column 8, lines 52-61). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the invention of Broyles et al. as modified in the rejection for claim 22 such that it includes means for storing the variables, as disclosed by Munoz et al. Motivation is provided in that it was well-known to one of ordinary skill in the art at the time of Applicants' invention that data is often stored in some sort of database for convenience in computer processing.

Claim 24 is directed to a computer readable medium containing computer-executable instructions which, when performed by a processor in a system, cause the processor to perform the method of claim 1. Therefore, Broyles et al. provides the same disclosures with respect to claim 24 as it did in the rejection for claim 1. Broyles

et al. fails to disclose any kind of system/manufacture for implementing its method.

Munoz et al. discloses a computer readable medium containing computer-executable

instructions which, when performed by a processor in a system, cause the processor to

perform an activity-based costing method (column 8, lines 52-61). It would have been

obvious to one of ordinary skill in the art at the time of Applicants' invention to modify

the invention of Broyles et al. such that it includes a computer readable medium

containing computer-executable instructions which, when performed by a processor in a

system, cause the processor to perform an activity-based costing method, as disclosed

by Munoz et al. Motivation is provided in that it was well-known to one of ordinary skill

in the art at the time of Applicants' invention that computers are often an efficient way to

process data.

Conclusion

16. **Examiner's Note:** Examiner has cited particular portions of the references as

applied to the claims above for the convenience of the applicant. Although the specified

citations are representative of the teachings in the art and are applied to the specific

limitations within the individual claim, other passages and figures may apply as well. It

is respectfully requested that the applicant, in preparing the responses, fully consider

the references in entirety as potentially teaching all or part of the claimed invention, as

well as the context of the passage as taught by the prior art or disclosed by the

examiner.

17.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to NATHAN ERB whose telephone number is (571) 272-

7606. The examiner can normally be reached on M-F 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, John Hayes can be reached on (571) 272-6708. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

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system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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